

Center for Nanoscale Materials (CNM)

User Safety Orientation

1 Introduction

1.1 Purpose

The information given here will help you work safely and fulfill Argonne National Laboratory (ANL) requirements. Although it may cover some of the topics in the ANL orientation, the emphasis is on CNM user policies and procedures.

1.2 Objectives

After completing this course you should be able to

- Understand and explain your responsibilities as a CNM facility user,
- Identify where you should go for help in specific situations, and
- Understand what to do in emergencies.

2 CNM User Work Authorization

Argonne National Laboratory requires that

- The CNM evaluate all work to be performed by users;
- The CNM and its users implement hazard controls consistent with Argonne policy and procedural requirements to reduce risks to acceptable levels; and
- The CNM Division Director or his designee authorize the conduct of work before it begins.

The CNM and its users meet these requirements by cooperatively developing *Work Authorization Records* and implementing the hazard controls specified in the records.

2.1 Work Authorization Records

Each CNM Work Authorization Record (WA) consists of

- A definition of authorized work,
- A description of required hazard controls that are both
 - Consistent with Department of Energy expectations and
 - Capable of reducing risks to acceptable levels,
- User acknowledgements,
- Management authorization, and
- Records sharing that required controls have been verified.

2.1.1 Definition of Authorized Work

The spokesperson for your group defined the work you are authorized to carry out at the CNM by identifying

- Participating personnel
- Equipment
- Materials
- Processes
- Recognized hazards

A CNM scientific contact may also have helped to define work by adding information that would be more clearly understood by

2.1.2 Hazard Controls

The CNM and affiliated divisions have evaluated the information about your work and the proposed hazard controls. Those controls fall into one or more of the following categories.

- Engineered controls
- Formal (written) procedures
- Information and training
- Experimental design
- Personal protective equipment

2.1.3 Verification that Controls Have Been Implemented

Argonne policy requires verification that prescribed hazard controls have been implemented, in some cases by personnel independent of your experiment. If such requirements apply to your work, they are prescribed in the Work Authorization Record. You may not proceed with any work until applicable verifications have been completed.

2.1.4 CNM and User Responsibilities

The CNM and its personnel are here to provide the support you need to work safely and effectively. Please give them the opportunity to carry out this responsibility by communicating openly with them.

The CNM expects you to

- Read the Work Authorization record (WA) for the planned work,
- Call to the CNM's attention any uncertainty about hazard control requirements and other expectations,
- Work in conformance with hazard control requirements set forth in the Work Authorization record,
- Sign an acknowledgement indicating that you have read the WA, including warnings contained in the record,
- Promptly report concerns and problems, and
- Alert the CNM about the need to modify work programs (e.g., additional equipment, materials, activities, etc.) and receive CNM approval before engaging in work not explicitly authorized in a [WA*](#)

2.2 Modifications to Planned Work

The CNM hopes that the planning that goes into each WA is sufficient, but also understands that, particularly in a research environment, plans may need to change. As soon as you know you need or want to conduct work outside of the scope defined in your WA, inform your CNM scientific contact. The CNM contact will do what is needed to accommodate the changes and secure management authorization.

3 Health Hazard Concerns Associated with Nanoparticles

The Center for Nanoscale Materials is aware of uncertainty about the toxic potential of nanoparticles. Specifically, nanosized materials may exhibit a different level of health risk than larger particles having the same chemical composition. The uncertainty is such that the Center will require reasonably conservative precautions consistent with the handling of toxic chemicals **whenever nanoparticles are handled in a form and manner that might cause them to become airborne or otherwise enable them to enter or contact the body or to be released into the general environment.** Such precautions will be specified in hazard control plans that are part of your WA. The precautions might require that

- Work be conducted in designated locations with engineered exposure controls, and/or
- Work follow formal procedures that specify prohibited and required work practices, including wearing personal protective equipment.

Precautions written into hazard control plans are mandatory for not only the nanoparticles whose toxic potential has been determined through empirical study, but also all other nanoparticles, including those composed of substances normally considered to be inert or to have low toxicity. Hazard control plans for nanoparticulate forms of substances otherwise managed as higher risk chemicals will require more rigorous controls, and those controls will, again, be specified in the hazard control plan for your

activity. Higher risk chemicals include

- Substances composed, in part, of some structures of biological origin,
- Compounds ANL considers to be carcinogens requiring rigorous control,
- Teratogens and mutagens, and
- Substances recognized as having high acute toxicity.

The effectiveness of some hazard controls for nanoparticles is not entirely clear; the CNM requires users to take all reasonable precautions to avoid exposure to dispersible nanoparticulates. Although such precautions normally will not be required for nanostructures "built" on substrates, they may, in some cases, be required for particles suspended in liquids.

4 Emergencies

The information provided in the Argonne ES&H orientation for facility users (ESH100u or "ANL 101") is applicable at the CNM. In addition, if you observe any event that results in personal injury or an uncontrolled release of a hazardous substance or energy that might cause injury or harm the environment, after you remove yourself from danger, and dial 9-1-1, you must notify your CNM scientific contact or the custodian of the laboratory in which you are working.

There are no penalties for dialing 9-1-1, even if the response seems to go beyond what seems reasonable. The greater risk is failing to dial 9-1-1.

4.1 Chemical Spills

Unless otherwise instructed by CNM or host division personnel, users should report spills by dialing 9-1-1 and wait for clean-up by ANL personnel. If you believe such a response is unnecessarily conservative for your work, call your concern to the attention of your CNM scientific contact.

Procedures may have a "contingency" section that deals with spill management. Such written guidance for a process supersedes this general guidance.

4.2 Fires

If a fire erupts, promptly report it from a safe location by dialing 9-1-1 and then report it to your scientific contact or another ANL worker.

4.3 Incidents in Cleanrooms

Although keeping cleanrooms clean is a high priority, worker well-being is more important. Although the CNM appreciates attempts to assist injured or sick workers in a manner that does not put the cleanliness of the work area at risk, **worker well-being takes precedence**.

5 Getting Help: CNM Personnel with Safety Responsibilities

5.1 CNM Scientific Contact

The CNM has assigned your group one or more scientific contacts whose responsibilities include the following (some of which have already been completed):

- Helping your spokesperson to complete a safety submittal,
- Introducing you to persons who will directly help support the conduct of your work,
- Ensuring that you get an adequate orientation to the facilities in which you will work and the Work Authorization record for your project,
- Facilitating modifications to Work Authorization records, and
- Providing for technical safety support.

5.2 Equipment and Laboratory Managers

The CNM and other ANL Divisions have assigned custodial responsibilities for each major piece of equipment, each location, and/or each process to specific individuals. Depending on the complexity of your work and the hazards it poses, you may be introduced to one or more of these managers. With respect to the facilities for which they are responsible, they are the persons to contact if you have a question or concern related to any safety, health, or environmental hazard that cannot be answered by your scientific contact. [Also see [Work in Locations Managed by Other ANL Organizations](#).]

5.3 Environment, Safety, and Health Officer

The CNM's ES&H Officer is a Certified Industrial Hygienist who is familiar with not only health hazards typically associated with CNM work environments, but also safety, transportation, and environmental concerns. As a certified professional, the CNM ES&H Officer must keep confidential business and personal information obtained during the conduct of his work unless required to disclose the information by law or an overriding safety or health consideration. The ES&H Officer is a resource available to all CNM users. You can contact this individual through your scientific contact, the CNM User Office, or the CNM Division Office.

The CNM ES&H Officer should be contacted whenever an incident – an accident with or without consequences – involves a CNM user or CNM authorized user activity.

6 Responding to Alarms

Your orientation to facilities in which you will be working will address alarms and how you should respond to them. You must pay attention to and respond immediately to all alarms and must familiarize yourself with exit paths.

7 Working Alone in CNM Facilities

The [Argonne policy](#)

limiting working alone applies to all work with and handling of strong corrosives, all spill clean-up, and all work in the cleanrooms. Restrictions on working alone may or may not appear in Work Authorization Records; however, working alone is generally not permissible. Please check with your CNM scientific contact, the CNM ES&H Officer, or the custodian for the in area which you will be working if you are uncertain, or have a special circumstance.

8 Work in Locations Managed by Other ANL Organizations

Particularly during “early access,” locations in which CNM users work may be managed by other ANL divisions. CNM users must adhere to policies and procedures authored by such “host” divisions whenever working in such locations.

To make expectation clear to its users, the CNM will attempt to integrate other host divisions policies and procedures into Work Authorization Records .

9 Sanctions for Conduct Inconsistent With Policies and Procedures

Although you are not a traditional Argonne National Laboratory employee, the Laboratory and the Department of Energy expect that you will conduct yourself and your work in conformance with DOE directives and Laboratory policy. The CNM has developed mechanisms like the Work Authorization record to clearly communicate expectations; the CNM expects you and other members of your group to take advantage of the safety support capabilities the CNM makes available to users so they can resolve concerns.

CNM management has and will use its authority to restrict user access if it finds that your conduct fails to meet defined expectations set forth in the Work Authorization record. Sanctions may be applied not only in cases involving intentional disregard, but also in cases of willful negligence.

When required, the CNM will modify the WA, adjusting the definition of authorized work and hazard control requirements.

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